TE-sem-VI-old-Civil-GE-II 1/6/16

QP CODE : 576601

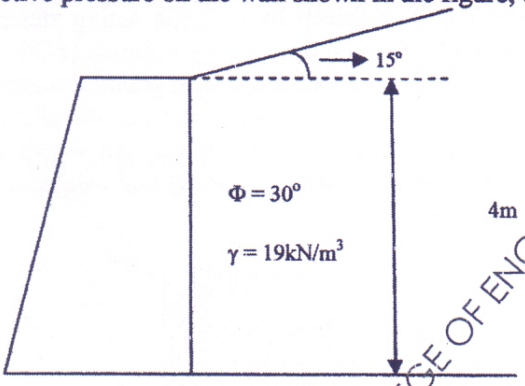
(3 Hours) [Total Marks: 100]

Instructions: 1) Question number 1 is compulsory.
2) Attempt any four from remaining six questions.
3) Assume any suitable data if not specified.

Q-1 (a) Explain: Slope stability number and weighted friction angle. 20
(b) Discuss the effect of water table on the bearing capacity of the soil.
(c) Describe various types of pile foundations.
(d) Define earth pressure at rest. Show the earth pressure distribution on retaining wall, assuming the soil is dry.

Q-2 (a) Compare Rankine's earth pressure theory with Coulomb's earth pressure theory. 06
(b) List various types of conduits and explain the factors that affect the load on conduit. 06
(c) A retaining wall is 8m high. The wall retains backfill of 19kN/m^2 on its vertical smooth face. The active pressure at the base of the wall is 30kN/m^2. Later a uniform surcharge of 15kN/m^2 is dumped above the fill. Determine the maximum active pressure and the resultant thrust on the wall after the surcharge is applied. 08

Q-3 (a) Explain with the neat sketch forces acting on ditch conduits. 06
(b) Determine the active pressure on the wall shown in the figure, using Rankine's theory. 06



(c) A cutting 10m deep is to be made in a soil having following properties: γ = 19.5kN/m^3 Cu = 20 kN/m^2 Φu=15^0. What is the maximum angle of the slope that will have a factor of safety against both cohesion and friction failure of 1.5. Adopt appropriate value of stability number from the following table. 08

β° \ Φ°	10	15	20
25	0.061	0.032	0.012
30	0.075	0.046	0.028

Q-4 (a) Explain various types of shear failures with neat diagrams. 06
(b) What is negative skin friction? What is its effect on the pile? 06
(c) What will be the gross net bearing capacity of sand having Φ = 36° and dry unit weight of 19 kN/m^3 for the following cases; a) 1.5 m wide strip foundation, b) 1.5 m x 1.5 m square footing, c) 0.75 m radius circular footing. The footings are placed at a depth of 1.5 m from ground surface. Assume factor of safety of 1.5 and use Terzaghi' s bearing capacity equations. 08

ϕ	N_c	N_q	N_γ
35	57.8	41.4	42.4
40	95.7	81.3	100.4

Q-5 (a) Explain the different types of reinforcing elements used for soil reinforcement. 06
(b) Write a note on under-reamed piles. 06

[TURN OVER

(c) The results of two plate load tests for a settlement of 25mm are given. 08

Plate diameter, m	Load, kN
0.305	31
0.61	65

A square column foundation is to be designed to carry a load of 800kN with an allowable settlement of 25mm. What should be the allowable settlement if the load is increased by 20%.

Q-6 (a) Define: (1) Net safe bearing capacity (2) Gross safe bearing capacity (3) Allowable soil pressure. 06

(b) Write a short note on Culmann's method for stability analysis. 06

(c) A concrete pile, 30cm diameter, is driven into a medium dense sand (γ= 21kN/m3, Φ' = 35°, K = 1.0, tanδ = 0.70) for a depth of 8m. Estimate the safe load, taking a factor of safety of 2.50. 08

Q-7 (a) Design a square footing to carry a load of 1500 kN. Assume cohesionless soil and adopt γ = 19 kN/m3, Φ= 38^0, Nq = 49, Nγ = 44.1 and D = 1.5 m, FOS =3. 06

(b) A precast concrete pile (35cmx35cm) is driven by a single acting steam hammer. Estimate the allowable load using (a) ENR formulae (FOS = 6) (b) Hiley Formula (FOS= 4). 06

(c) The cantilever retaining wall shown below is backfilled with granular material having a unit weight, of 19 kN/m^3 and an internal angle of friction, 30°. Assuming that the allowable bearing pressure of the soil is 120kN/m^2 , the coefficient of friction is 0.4 and the unit weight of reinforced concrete is 24kN/m^3. Determine (1) the factors of safety against sliding and overturning. (2) Calculate ground bearing pressures. All dimensions are in mm. 08